

**REMARKS**

Claims 1-14 are pending. Claim 1 is an independent claim.

**ENTRY OF THE AMENDMENT**

The above amendment should be entered because it should place the application in condition for allowance.

Accordingly, it is requested that the Amendment presented, even though after final, be entered.

**REPLY TO REJECTIONS****First Rejection**

Claims 1-5, 8, and 10-14 were rejected as being unpatentable Sanbayashi et al. (U.S. Patent No. 5,349,816) in view of Hu et al. (U.S. Patent No. 6,044,644). This rejection remains traversed.

Directing attention to base claim 1, no *prima facie* case of obviousness has been established.

As now amended, claim 1 has the feature as follows:

the light-off catalyst and the exhaust gas purifying means are in an exhaust passage and in series so that all the exhaust gas from the engine passes through both catalysts regardless of the engine operation modes.

This is not shown or suggested in the references applied.

**EXPLANATION OF REFERENCE**

The exhaust gas purifying apparatus of Sanbayashi et al. has selective reduction type NO<sub>x</sub> catalyst which reduces NO<sub>x</sub> to N<sub>2</sub> by HC as the reducing agent in the catalyst.

As for this exhaust gas purifying apparatus, the warm-up catalyst is arranged in the upstream of said NO<sub>x</sub> catalyst, and, all the exhaust gas is led to said NO<sub>x</sub> catalyst by bypassing the warm-up catalyst at the lean air/fuel mixture operation mode.

This selective reduction type NO<sub>x</sub> catalyst is indispensable HC as the reducing agent and cannot arrange the warm-up catalyst in the upstream side exhaust passage of said NO<sub>x</sub> catalyst.

In summary, when all the exhaust gas is introduced into the warm-up catalyst at the lean air/fuel mixture operation mode, HC is purified by the warm-up catalyst, therefore, NO<sub>x</sub> cannot be purified with said NO<sub>x</sub> catalyst HC was purified.

Therefore, the by-pass passage is indispensable in the exhaust gas purifying apparatus of Sanbayashi et al.

The exhaust gas purifying apparatus of Hu et al. has a three-way catalyst and closed-couple catalyst which substantially free (decreases) the oxygen storing components to the upstream of the three-way catalyst. Therefore, the oxidation of CO in the closed-couple catalyst is controlled and temperature rises about the three-way catalyst.

However, Hu et al. does not describe that NO<sub>x</sub> releasing or reducing the NO<sub>x</sub> trap catalyst.

**DISTINCTION BETWEEN THE CONTEXT CLAIMED  
AND THE REFERENCE**

The combination technology of Sanbayashi et al. and Hu et al. provides “Exhaust gas purifying means which has light-off catalyst which decreases oxygen storage components (such as ceria and praseodymia) to the upstream selective reduction type NO<sub>x</sub> catalyst and bypasses light-off catalyst at lean air/fuel mixture operation mode.”

Accordingly, the feature of claim 1 of this invention “the light-off catalyst and the exhaust gas purifying means are in an exhaust passage and in series so that all the exhaust gas from the engine passes through both catalysts regardless of the engine operation modes” is not known or suggested by the combination of Sanbayashi et al. and Hu et al..

**Second Rejection**

Claims 3, 4, 6, and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sanbayashi et al. and Hu et al. as applied to claim 1 above and further in view of Design Choice. This rejection is traversed.

Initially, the assertion of Design Choice does not cure the deficiencies innate in the rejection based on the Sanbayashi et al. and Hu et al. references.

Secondly, it was asserted that there is nothing of record which establishes that the claimed maximum volume metric or weight amount of

oxygen absorbed in a light-off catalyst presents a novel of [sic or] unexpected result.

The result of this particular limitation is that the device can more efficiently function to perform its purpose. There is nothing in the art to suggest this structure.

In fact, the Specification does provide an explanation of the importance of the structure set forth in claims 3, 4, 6, and 7. See, for example, page 6, line 27 to page 7, line 2 and page 17, line 12 to page 18, line 9 of the Specification. Also, the assertion of a matter of design is unsupported and merely conjecture on the part of the Patent Office because the structure claimed provides a result that it is a function not shown or suggested in the art applied. See In re Chu (cited in the last reply and appearing in the list of decisions in the MPEP) wherein the Judge Rich writing for the Court, stated as follows:

Finding of "obvious design choice" precluded with the claim structure and the function it performs are different from the above.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the rejection of the claims under 35 U.S.C. § 103.

### **Third Rejection**

Claim 9 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Sanbayashi et al. and Hu et al. as applied to claim 8 above and further in view of Official Notice. This rejection is traversed.

Initially, claim 9 is considered patentable for the same reasons as claim 8. The taking of Official Notice does not cure the innate deficiencies of the rejection based on Sanbayashi et al. and Hu et al.

Additionally, while a direct injection engine may be known, the rejection is incomplete in establishing a *prima facie* case of obviousness because the rejection lacks a motivation to make the combination. This is a basic requirement of a rejection under 35 U.S.C. § 103.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the rejection of the claim under 35 U.S.C. § 103.

#### **PRIOR ART**

While additional prior art has been cited in Section 9 of the Office Action this art has not been considered because the art was not applied in any rejection.

#### **REPLY TO SECTION 7 OF THE OFFICE ACTION**

In the Office Action, in Section 7, the Patent Office responded to Applicants arguments. The response in Section 7, on page 6, line 1 to page 7, the end of the first paragraph, has been answered, supra.

With respect to the response set forth in the second paragraph, it was asserted that no weight could be given because the result was not set forth in the rejected claims. It is not necessary for the result to be set forth, because the features of what has been claimed, i.e. regarding the light-off catalyst and the lean O<sub>x</sub> catalyst are in the exhaust passage and in series performs the

result. It is not necessary for the result of this structure (feature) be set forth in the claims. In fact, this argument is supported by law, which has been present for four decades in patent law as set forth in the case of In re Merchant (197 USPQ 785, CCPA 1978) (also cited in the MPEP) wherein the court stated as follows:

Finally, the solicitor repeats the objection voiced by the examiner that the declaration is irrelevant because the claims specify neither the unexpected result nor the "features" that produce that result. We are aware of no law requiring that unexpected results relied upon for patentability be recited in the claims. (underline added)

### **CONCLUSION**

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone Mr. Elliot Goldberg at (703) 205-8000 in the Washington, D.C. area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE****IN THE SPECIFICATION**

The paragraph beginning on page 20, line 18, has been amended as follows:

In an oxygen excessive atmosphere (lean atmosphere), O<sub>2</sub> is initially adsorbed onto the surface of platinum (Pt), and NO in the exhaust gas reacts with O<sub>2</sub> on the surface of the platinum (Pt), to produce NO<sub>2</sub> ( $2\text{NO} + \text{O}_2 \rightleftharpoons 2\text{NO}_2$ ), as shown in Fig. 3(b).

The paragraph beginning on page 21, line 13, has been amended as follows:

Then, the released NO<sub>2</sub> is reduced by unburned HC, H<sub>2</sub>, and CO contained in the exhaust gas, and discharged as N<sub>2</sub>, as expressed by ( $\text{NO} + \text{CO} \rightleftharpoons 1/2 \text{N}_2 + \text{CO}_2$ ), ( $\text{NO} + \text{H}_2 \rightleftharpoons 1/2 \text{N}_2 + \text{H}_2\text{O}$ ).

**IN THE CLAIMS**

The claims have been amended as follows:

1. (Amended) An exhaust gas purifying apparatus of an internal combination engine, comprising:

exhaust gas purifying means, provided in an exhaust passage of the internal combustion engine, for absorbing NO<sub>x</sub> in exhaust gas when an air-fuel ratio of the exhaust gas is lean, and releasing or reducing the absorbed NO<sub>x</sub> when an oxygen concentration of the exhaust gas is reduced;

a light-off catalyst provided upstream of the exhaust gas purifying means in the exhaust passage, said light off catalyst having a lower O<sub>2</sub> storage capability than said exhaust gas purifying means; [and]

the light-off catalyst and the exhaust gas purifying means are in an exhaust passage in series so that all the exhaust gas from the engine passes through both catalysts regardless of the engine operation modes; and

control means for controlling the air/fuel ratio of the exhaust gas so that an atmosphere having a reduced oxygen concentration is produced around said exhaust gas purifying means when an NO<sub>x</sub> conversion efficiency of the exhaust gas purifying means is decreased.